

## An introduction most determined: Mallard (*Anas platyrhynchos*) to New Zealand

JOHN DYER

Auckland-Waikato Fish & Game Council, Brymer Rd, Hamilton, New Zealand

MURRAY WILLIAMS

School of Biological Sciences, Victoria University, P.O. Box 600, Wellington, New Zealand

**Abstract** The introductions of mallard (*Anas platyrhynchos*) to New Zealand, and their breeding and release as a game bird by Acclimatisation Societies are summarised. We identify 19 importations, 14 of which (a total of 115 birds all from Great Britain) were sufficient to establish small feral populations in southern and central New Zealand by about 1910. Five subsequent importations were made by Auckland C.A. Whitney, 3 from Great Britain in 1910 (6 birds), 1914 (number unconfirmed) and 1927 (393 birds), followed by 99 birds (1937) and 45 eggs (1941) both from the USA. It was Whitney's distribution of eggs following his initial USA importation that prompted widespread breeding and release programmes which, in some regions, extended into the 1960's and 70's. We identify a minimum of 30,000 mallards having been released by Acclimatisation Societies, but numerous releases by private individuals remain unrecorded. Almost all regional Acclimatisation Societies at some time released mallards into the wild.

Dyer, J.; Williams, M. 2010. An introduction most determined: Mallard (*Anas platyrhynchos*) to New Zealand. *Notornis* 57(4): 178-195.

**Keywords** Mallard; *Anas platyrhynchos*; acclimatisation; introduction; New Zealand

### INTRODUCTION

The desire of 19<sup>th</sup> Century European settlers in foreign lands for plants and animals whose tillage, husbandry, or use as game they were familiar with, prompted deliberate importations of Europe's nature throughout the world. In Australasia, numerous Acclimatisation Societies were established by settlers to organise and fund these importations (Lever 1992; McDowall 1994). New Zealand's many Acclimatisation Societies, established from the early 1860's, introduced a bewildering array of plants and animals (Thomson 1922; Druett 1983; McDowall

1994). Among these were at least 25 species of waterfowl (Anseriformes) as well as several species of upland game (Galliformes) to fill the perceived void of suitable avian sporting quarry.

Presently 7 exotic waterfowl species occur as wild populations in New Zealand of which mallard (*Anas platyrhynchos*) is the most numerous and widespread (Robertson *et al.* 2007). It is the 2<sup>nd</sup>-most widely distributed of all waterfowl, after the endemic paradise shelduck (*Tadorna variegata*) and is probably the most common and familiar waterfowl in the country. Since its introduction, the mallard has colonised all of New Zealand's distant islands, as well as Lord Howe, Norfolk and Macquarie Is in the Tasman Sea (Hermes *et al.* 1986; Norman 1990;

---

Received 30 Aug 2010; accepted 8 Feb 2011

Correspondence: [murray.williams@vuw.ac.nz](mailto:murray.williams@vuw.ac.nz)

Tracy *et al.* 2008), and makes occasional landfall in Australia (Balham & Miers 1958; Marchant & Higgins 1990; Paton 1991).

The mallard's introduction to New Zealand followed the familiar pattern of accompanying new European settlement around the world. Today, populations derived from these introductions persist also in southern Africa, Australia, Tasmania, south-eastern USA, within the Caribbean, Hawaii, Falkland Is, Madagascar and the Mascarene Is (Long 1981; Lever 2005; Kear 2005). What may distinguish the mallard in New Zealand, however, is the scale and vigour with which Acclimatisation Societies promoted its introduction.

In this paper we summarise the history of mallard importations to New Zealand. We are aware that first-hand information on 19<sup>th</sup> Century importations has a scant trail and, for some, Thomson's (1922) compilation closer to the time may have to stand unverified. Nevertheless, we have attempted to reconfirm Thomson's details wherever possible. Equally, we were aware that considerable breeding and release efforts post-date Thomson's account (e.g. importation of United States-sourced mallards), and we seek to bring the history of this most determined of avian introductions closer to the present day.

We also document the regional extent of breeding and release programmes for mallards undertaken by Acclimatisation Societies. The scale of these ventures has, hitherto, only been hinted (e.g. Balham 1952; Reid 1966; McDowall 1994). Although frequency of introductions and numbers introduced have been highlighted as key determinants for successful avian introductions (Veltman *et al.* 1996; Cassey *et al.* 2004; Lockwood *et al.* 2005), it is this record of actual releases that may better inform the pattern of mallard population establishment and expansion in New Zealand.

We have not attempted to place the mallard's introductions and releases into the socio-political and environmental contexts of their times, other than briefly in passing. Making judgements today of things done yesterday clearly requires an understanding of those contexts; these can be gleaned from reports, records and regional histories of Acclimatisation Societies, and are well summarised by McDowall (1994).

## SOURCES OF INFORMATION

Numerous regional Acclimatisation Societies were established in New Zealand by the late 1890's (McDowall 1994). Some were short-lived before amalgamating with a larger neighbour (e.g. Fielding, Opotiki) or being replaced by government agencies (e.g. Lakes, Rotorua). Although boundaries between neighbouring societies occasionally changed, most

encompassed well-defined political or geographic areas as reflected in their names and as periodically specified in issues of the *New Zealand Gazette*. Place or regional names referred to in our text may be located in most substantive New Zealand atlases (e.g. Bradley 1999).

We endeavoured to view all Acclimatisation Society annual reports available in 3 collections (National Library of New Zealand, Department of Conservation, Wellington, and National Institute for Water and Atmospheric Research, Christchurch). We reference these reports in our text by abbreviated Society name and year of publication (e.g. OAS 1897 ann. rept.). Although all Societies were required to publish an annual report for distribution to their members, not all reports survive in these collections. Ideally, examination of all meeting records of each Society would have made for more certain listing of mallard introductions and breeding activities since details may not always have been included in their annual reports. However, many of these records from a century ago no longer exist either. To compensate, we scoured pre-1920 copies of provincial newspapers in the digital collections of the National Library of New Zealand ("Papers Past") knowing that many monthly meetings of the Societies were regularly reported. Later-dated newspapers were searched for details about specific Acclimatisation Society activity. We reference these sources in our text by newspaper name and date (e.g. *Daily Southern Cross* 8 Apr 1862). We also examined archived Internal Affairs Department files held in the National Archives of New Zealand, Wellington, for details of waterfowl import permits and mallard liberations. These are identified by file number (e.g. IAD 49/69/2).

We suspect there were private importations of mallards and other waterfowl, especially in the last quartile of the 19<sup>th</sup> Century that went unreported. Sullivan (1997), for example, chronicles the activities of Auckland's Whitney family in assembling a collection of mallards and other exotic waterfowl, initially at their "Wenderholm" estate. Doubtless, in the era when wildlife importing was encouraged and permits were not required, there were others with money, interest and opportunity to do likewise and leave no detectable paper trail.

Breeding and subsequent liberations of mallards by Acclimatisation Societies generally are well documented in their later (post-1910) annual reports, and sometimes recorded in local newspapers. Additionally, post-1948 liberations required each bird to carry a numbered leg band. Banding details, as well as liberation sites, are recorded in the archived records of the New Zealand Bird Banding Office (Department of Conservation, Wellington).

## INITIAL INTRODUCTIONS

The earliest reference we have found to mallards (or "English wild duck" as they were often referred to) reaching New Zealand is in *Daily Southern Cross* (8 Apr 1862) when reporting the arrival at Onehunga of the ship *Cashmere* from London. However, this report is contradicted 1 month later, by the publication of a list of birds imported on the *Cashmere* (*Daily Southern Cross* 9 May 1862) which included just 2 species of geese and no ducks.

The Otago Acclimatisation Society (OAS) was at the forefront of deliberate Acclimatisation Society efforts to introduce mallards. Thomson (1922) lists the Society's 1867 importation of a pair from Melbourne Zoo as the earliest record and these birds were in the grounds of the Society early the following year (*Daily Southern Cross* 30 Apr 1868). Two years later the Society imported 5 birds, and another 4 in 1870, both from London (*Southland Times* 2 Sep 1870; Thomson 1922) and 8 birds, presumably the progeny of the initial importation, were reported "alive in good health" in early 1869 (*Daily Southern Cross* 9 Feb 1869). Thomson (1922) lists 2 further importations by this Society, in 1879 (3) and 1881 (9), from London and although we cannot find newspaper reports confirming these the Society did send 9 "English wild duck" to Riverton in 1882 "where it is hoped they will multiply and thrive" (*Otago Witness* 3 Jun 1882).

The OAS was responsible for 2 further importations, of 21 in 1896 and 17 in 1897. From the 1896 shipment (on *s.s. Mamari* from London; *Otago Witness* 30 Jan 1896), 10 mallards were forwarded to the Southland Society and the remainder housed at the OAS Clinton Hatchery (*Otago Witness* 4 Jun 1896). The 1897 importation was also from London (aboard *s.s. Aotea*) with 1 pair being placed in Dunedin's Botanical Gardens (*Otago Witness* 1 Apr 1897) and the remainder sent to Clinton (Thomson 1922).

North I interest in mallards commenced with the Auckland Acclimatisation Society's (AAS) importation of 2 in 1870 (Thomson 1922). These birds were sourced from the Acclimatisation Society of Victoria (*Daily Southern Cross* 7 Feb 1871). This importation coincided with the liberation of newly-acquired mallards into the Melbourne Botanical Gardens (Ryan 1906) and the Auckland birds were similarly placed in the AAS gardens at the Auckland Domain (Thomson 1922; Ashby 1967). Not until 1886 did AAS again record its interest in mallard, this time as a consequence of a gift from a recent immigrant and hunting enthusiast, John Whitney. Whitney arranged for "a consignment of 4 English wild ducks" from Annesley Park, Notts, England, which upon receipt, the Society "intended to keep to breed from and to distribute the eggs or young to suitable localities from time to time"

(AAS 1887 ann. rept.). The birds didn't breed at the AAS gardens and were moved to Lake Takapuna, a protected area, where subsequently they bred successfully (AAS 1890-92 ann. repts.).

The Canterbury (CAS) and Wellington (WAS) Acclimatisation Societies also imported mallards. In 1884, having sent native waterfowl to the London Zoological Society, the CAS received in return "an extremely well selected assortment of English and other waterfowl" (*Otago Witness* 2 Aug 1884) including 2 mallard which arrived on *s.s. Ruapehu*. The CAS already had mallards in its collection as early as 1873 (Thomson 1922), presumably progeny of earlier OAS importations. The WAS's first importation was not until 1893 (WAS 1894 ann. rept.; *Evening Post* 28 Apr 1893) when 19, sourced from London game dealer Philip Castang, reached the Society's Masterton enclosures (Thomson 1922). Four years later, both Societies joined 5 others to import a large consignment of gamebirds (*North Otago Times* 8 Oct 1897). After a stormy passage during which many birds died, *s.s. Tongariro* delivered 20 mallards into Wellington, some intended for distribution to Taranaki and Canterbury.

Sir Walter Buller imported a pair from England as part of a larger game bird consignment on *s.s. Doric* in 1894 (*Otago Witness* 15 Mar 1894; *Evening Post* 19 Mar 1894) intended for release at his Lake Papaitonga estate in the Horowhenua. He later gifted some of the progeny to the WAS. However, Buller's (1905) remark "Fourteen years ago I brought from England and turned out on the Papaitonga lake a number of mallards which bred freely and spread the first season to the Horowhenua lake and the adjacent lagoons" could be interpreted as implying an earlier and larger importation.

Five mallards were imported privately from England and delivered to the West Coast Acclimatisation Society in late 1903 (*West Coast Times* 3, 4 Nov 1903).

Thomson (1922) chronicles the role of the New Zealand government in importing deer and game birds in the early 20<sup>th</sup> Century. Referring to mallards, he states (p. 102), "In 1904 the (Wellington) Society received 4 pairs imported by the government ....". However, the Society's 1905 annual report, which tabulates the full list of species received, does not corroborate this, referring instead to the receipt of 4 black duck (*A. rubripes*). Despite Buller (1905) remarking "...the Seddon government, much to their credit, have introduced a larger contingent (of mallards), a fair share going to Papaitonga because of its close protection", mallards were not among the 10 American waterfowl species imported by the Tourist and Health Resorts Department in 1904 and none of these birds were released at Lake Papaitonga (AJHR 1905).

Thus, aside from further mallards possibly being imported by Buller, we have identified 14 importations totalling 115 mallards prior to 1910.

## INITIAL PROPAGATION AND RELEASES TO 1910

Some Acclimatisation Societies maintained "gardens" where their recent animal importations were displayed to the public and where initial breeding of some animals was attempted (e.g. Christchurch's Hagley Park and The Domain in Auckland; McDowall 1994). Where premises did not permit extensive propagation for release, "settlers" were entrusted with birds and eggs and encouraged to release them directly or sell them back to the Society for release (McDowall 1994). This approach featured prominently in the initial acclimatisation of mallards.

### Otago Acclimatisation Society

Otago's 3 importations, of 11 birds, between 1867 and 1870, were followed by their breeding and release by Society members. Although not formally recorded in the Society's annual reports, local newspapers carried occasional reports, e.g. "Mr Wheatley who takes the liveliest interest in acclimatisation, has a flock of English wild duck sporting on the Kakanui River, from the produce of which he last year distributed 250 into different parts of the province. One of these last season laid 59 eggs and reared 2 clutches" (*Otago Witness* 18 Jul 1874; see also *Otago Witness* 1 Oct 1870, *North Otago Times* 31 Oct 1873, *Nelson Examiner* 29 Dec 1873 and *North Otago Times* 4 Dec 1876).

We have been unable to locate details of subsequent mallard breeding and distribution in Otago. A tabulation of "birds liberated in Otago -1876-1909" (OAS 1910 ann. rept.) lists just 9 mallards being released in 1881 and none in other years, but this is clearly not so. Birds from the Society's 1896 and 1897 importations reached its Clinton breeding facility and were undoubtedly bred and liberated from there as well as possibly being widely distributed to Society members for breeding. Mallards remained in captivity at Clinton through to 1909 when a reinvigorated breeding and release programme commenced.

### Wellington Acclimatisation Society

Progeny from the Society's 1894 importation were immediately distributed to settlers as well as being released (WAS 1895 ann. rept.) while the Masterton aviary held 32 birds as breeding stock. The following year the Society reported that its stock birds had laid 160 eggs which were distributed to 6 Wairarapa settlers for hatching and release and 1 dozen sent to Southland Acclimatisation Society. The Society also had the Government set aside "an area of land

near Martinborough as a preserve for English wild duck" (WAS 1896 ann. rept.).

In about 1903, the Society established a game farm at Paraparaumu and mallards were then reared there as well as at Masterton. Ongoing egg distribution and releases in the Wairarapa area were complemented by releases at the Paraparaumu game farm and in the Palmerston North – Levin area. For example, the WAS 1906-1909 annual reports chronicle releases of mallards at Horowhitu Lagoon near Palmerston North and some of the 100 birds raised at the game farm in 1907-08 were released at Lake Papaitonga, Otaki Valley, and elsewhere in Horowhenua. During 1907-1909 almost 400 mallards were bred by the Society at Paraparaumu alone and releases made near Eketahuna and Hunterville. Presumably birds already in the hands of settlers, particularly in Wairarapa, were also breeding and dispersing.

### Auckland Acclimatisation Society

Pre-1910 records of mallard in the Society's annual reports are limited to chronicling the fate of the birds transferred from the Society's gardens to Lake Takapuna (1890-92), to an interest in acquiring new stock (1896, 1903), and to supporting an introduction of mallards to Lake Okareka (1906). The latter is also referred to by Thomson (1922) who indicated they "increased to a flock of about 200".

The 1909 annual report refers to mallards as "...increasing in certain portions of the Wellington Province and is also said to be well established on the lake at Cambridge Domain". The presence of mallard at Cambridge's town lake is a hint of extra-Society mallard breeding and release, some of which was reported to the AAS in 1910 (and also published in *Progress* 2 May 1910) by a Society councillor, Cecil Whitney: "During the last 3 years I have successfully hatched and reared somewhere about 300 mallard ducks, besides which a large quantity of duck eggs have been distributed to friends in various parts of the Auckland Province. Out of the first lot of mallards reared, about 45 were placed on the St John's Lake, but owing to the shooting both in and out of season I regret to say so far as I can ascertain none have survived.....The mallard ducks have been distributed by me in the following localities: Cambridge Lake, Hamilton Lake, Henderson, Kopu, Thames, Wairamarama, Rotorua, Dargaville, Waiwera, Mercury Bay and Rangiriri Lake, and to some friends residing in Auckland and suburbs. Eggs have been distributed amongst friends in districts too numerous to mention. The reports from Cambridge last year were exceptionally good.....I have not sent any to Cambridge this season. The balance of this season's hatching (about 40) will be liberated on Rangiriri Lake almost immediately and it is to be hoped they will do well. ....The duck

are from stock imported by Major Whitney from Annesley Park, Nottingham, England some years ago, and presented to your Society by him; they have been mixed with a strain presented to me by the Wellington Acclimatisation Society, but I do not know where the Wellington mallard duck originally came from. This season from 4 ducks and 1 drake I obtained 220 eggs and hatched 94 per cent of the eggs set, all of which were hatched by the ordinary barn-door hens....."

Cecil Whitney's role in promoting mallard importation and widespread establishment via captive breeding and release was well underway, and was soon to be expanded (see later).

#### **North Canterbury Acclimatisation Society (NCAS)**

We can find no records of breeding or releases of mallards by this Society despite it having in 1873 "12 in their gardens kept for breeding purposes..." (Thomson 1922) and receiving imports in both 1884 and 1897. Lamb's (1964) historical account of the Society makes no reference to acclimatisation of mallards being a focus of its activities. Apart from the remark "...by courtesy of Mrs Townsend the Canadian geese and some English mallards were turned out on her reserves at Glenmark and both species have bred there" (NCAS 1908 ann. rept.), there are no references to mallard in the annual reports of the Society for this period. However there was clearly interest and activity; "Some time ago the Canterbury Acclimatisation Society devoted a portion of their funds to the breeding of mallard ducks. This has proved so successful that it has been decided to send to England for some more. On their arrival they will be placed in the gardens" (*Poverty Bay Herald* 14 Apr 1908). And settlers were also actively breeding and releasing mallards; "At the present time several landowners who are interested in acclimatisation are trying to re-introduce pheasants into Canterbury, and efforts are also being made to acclimatise the English wild duck or mallard" (*Poverty Bay Herald* 8 Jun 1908).

#### **Other Acclimatisation Societies**

Mallards were received and distributed by other Acclimatisation Societies at this time. Recorded examples include: (1) Hawkes Bay - an early mallard transfer from Otago to Napier (*North Otago Times* 30 Mar 1876); (2) Taranaki - a release on Barrett's Lagoon, New Plymouth (*Taranaki Herald* 22 Aug 1898), perhaps the residue of the 1897 consignment into Wellington; (3) East Coast - "It would be a good idea if the Acclimatisation Society would prohibit the shooting of duck and swan on Lake Waikaremoana.....The English mallard and crested grebe on Lake Waikareiti are almost sure to wander down to Waikaremoana..... they will be 'potted' by all and sundry able to carry a gun" (*Poverty Bay*

*Herald* 27 Apr 1898); (4) Westland - 8 pairs were liberated at the head of Lake Kanieri in January 1904 (*West Coast Times* 5 Apr 1905); (5) Hawera - "pairs have been liberated at Kakaramea, Makino and Hawera" (*Hawera & Normanby Star* 11 Mar 1905); and (6) South Canterbury - "It is said that the mallard (and wigeon) liberated on Lake Ohau, Lake Alexandria and on some lakes of the West Coast of the South Island are doing well" (*Evening Post* 12 Mar 1904).

South Canterbury Acclimatisation Society (SCAS) was particularly active, its ranger breeding and releasing mallards over several years (1904, 1907, 1909 ann. rept.s; *Ashburton Guardian* 17 Sep 1907) and exchanging eggs with the Wellington Society.

The Southland Acclimatisation (SAS) first received mallards from Otago's 1896 importation and also eggs from Wellington in the same year. The Otago mallards (5 pairs) were sent to a settler at Thornbury to breed and liberate (SAS 1896 ann. rept.). The 1909 annual report indicates renewed interest and the presence of 64 as breeding stock at the Society's hatchery.

Records of many Acclimatisation Societies for the pre-1910 period are incomplete and most likely our summary merely scratches the surface of an active and formative period in the acclimatisation of mallards. The distribution of eggs and the subsequent feeding and protection of birds on settlers' properties was most likely the main method of mallard propagation and expansion, a process unlikely to have been chronicled anywhere in any detail. Balham (1952) provides a hint of how effective this may have been when referring to the same approach around 1930: "...several farmers ...began to breed and liberate mallards. The birds were fed regularly and not pinioned; free to come and go at will. So successful were their efforts that many farmers found it a burden feeding hundreds of mallards and many ceased feeding so ducks were forced to disperse into new areas. One farmer ... started with a few pairs, but after 3 years more than 500 ducks were alighting to feed on his lawn, and during a periodical visit to gather eggs for further distribution, (the) ranger... once collected 398 eggs from less than 1 acre. The birds nested in grass and short cover under an open stand of pines close to the homestead."

#### **BREEDING AND RELEASES 1910 – 1939**

Over the 3 decades subsequent to 1910, many Acclimatisation Societies bred and released mallards directly (Table 1) and their annual reports, generally all available, chronicle this activity. This was a response to the obvious and troubling decline of native grey duck (*A. superciliosa*) in the face of

**Table 1.** Summary of numbers of mallards bred and released by Acclimatisation Societies in decades 1910's – 1930's. "Private" indicates breeding and releases not funded by Societies; "egg" indicates the Society's role was confined to providing eggs to members for rearing and subsequent release.

| Acclimatisation Society | 1910's                         | 1920's             | 1930's  |
|-------------------------|--------------------------------|--------------------|---------|
| Auckland                | 50/yr + private                | ~200 + private     | Private |
| Wanganui                | -                              | <100 + egg         | -       |
| Wellington              | 100/yr                         | Private            | Private |
| Nelson                  | -                              | Private            | -       |
| North Canterbury        | Private releases + eradication | -                  | -       |
| South Canterbury        | 600+                           | -                  | -       |
| Waitaki –Waimate        | "Some"                         | -                  | -       |
| Otago                   | 300+                           | wild transfers 500 | -       |
| Southland               | 700+                           | ~300               | -       |

widespread agricultural development and wetland drainage (Balham 1952). Although some societies (e.g. Auckland, North Canterbury, Wellington, Hawkes Bay) attempted captive breeding of grey duck it was everywhere a failure and the more compliant mallard, with its already long history of breeding in captivity, became favoured as a means of providing more abundant sporting quarry.

The known propagators of mallards are listed in Table 1. Although members of North Canterbury Acclimatisation Society undertook some breeding and releases, the Society began eradicating mallards in 1914 (*Ashburton Guardian* 10 Jul 1914). Mallards were seen as threatening the native grey duck by hybridising with it (NCAS 1916 ann. rept.), an outcome noted elsewhere (Auckland, Wellington).

The scale of individual Society activity is indicated below.

#### Wellington Acclimatisation Society

Mallard breeding at the Paraparaumu game farm is chronicled in the society's 1910-1916 annual reports but they indicate a slowly waning effort from the 170-180 of 1909-10 to just 58 in 1916 when disease at the game farm required all birds to be released. The programme never restarted. The principal locations of releases were Manawatu-Rangitikei (Hokowhitu, Levin, Marton, L. Horowhenua), Taihape – Hunterville, and Eketahuna, and mallards were sufficiently well established to be hunted by the late 1920's.

Hybridisation with grey duck was noted early (WAS 1913, 1916 ann. repts.). Later, ranger Tom Andrews notes mallards being "very pugnacious and worry the grey duck unceasingly in the breeding season" and the following year declares that mallard liberations were discontinued "because it was feared that they would cross with the native

grey duck and in time probably adsorb this fine game bird" (WAS 1932 ann. rept.).

While the Society did not itself pursue mallard breeding and release in the 1920's and 1930's, it is clear there were many private initiatives supported by the Society, especially in the Manawatu and Rangitikei districts. Andrews (1939) hints at its scale when he lists farmers at Makariki, Karere, Bunnythorpe and Foxton "between them, (they) are breeding hundreds of birds every year".

#### Wanganui Acclimatisation Society

The first indication that this Society contributed to mallard releases appears in its 1923 annual report advising of a considerable increase in mallard ducks locally and of mallard eggs being distributed for hatching. The following year both eggs and birds were distributed but the 1925 & 1926 annual reports comment solely on the increase and spread of mallards. In 1929 mallards were again procured and released. However, the 1930 annual report signalled a change in approach; "A consignment of 50 birds was procured but in view of subsequent reports from the South Island and Auckland Acclimatisation Society that the introduction of mallard there had proved detrimental to the native grey duck it was decided to abandon the efforts". For the next decade statements of concern about the grey duck's future occupied its annual reports.

#### Nelson Acclimatisation Society

The annual reports of this Society contain no references of interest in mallards during this time period. Sowman (1981), in his Society history, states "There appears no mention of this species of waterfowl in any of the early imported gamebird lists of the Nelson Society until 1913 when a circular letter was received from the Canterbury Society in



**Fig. 1.** (Left) Cecil Whitney, the driving force behind mallard acclimatisation in New Zealand, in his Colonial Ammunition Company office, 1902. Large numbers of mallards were bred in the company's grounds at Mt Eden (Photo: Auckland Museum). (Right) Sir Cecil Whitney, at 79, enjoying his Churchill wetlands at Rangiriri, 1947. These wetlands were where he personally released many of his mallards (Photo: Gray Whitney).

respect of the bird. Sometime later the Wellington Society advised they had English mallard for sale at 12s a pair, and a Nelson member stated he would like to obtain a few; however, there appears no indication that he achieved this end. Throughout the intervening years many sportsmen and private individuals in Nelson acquired mallards from time to time or purchased settings of eggs for hatching and eventual release in the province. These efforts, perhaps because of lack of protection and control, appeared fruitless and the birds failed to acclimatise or increase in number."

#### **South Canterbury Acclimatisation Society**

This Society's interest in breeding and release, which commenced about 1907, continued until at least 1914. Their ranger raised and distributed 100 mallards in 1910 (1911 ann. rept.), but in the following 2 years mallards for release were purchased. The 1914 annual report indicates 300 mallards were released on Washdyke Lagoon and indicated further batches would be liberated in the McKenzie country. Whether this latter ambition was achieved is not recorded. Perhaps influenced by North Canterbury's changed attitude to mallards, no further releases were funded. In 1917 the mallard was placed on its hunting licence.

A *Geraldine Guardian* (29 Aug 1928) report of Society matters indicates breeding interest was not

entirely dead by cautioning that members "should not follow Auckland and breed mallard unless they wanted to spoil the native grey duck".

#### **Waitaki-Waimate Acclimatisation Society**

This Society reported releasing unspecified numbers of mallards each year 1910-1913. Thereafter its annual reports make no mention of such activity, but the 1914 and 1915 balance sheets record significant expenditure on "feeding game" sufficient to suggest releases occurred in those years also. There is nothing in post-1925 annual reports of the now separate Waitaki Valley and Waimate Acclimatisation Societies to indicate any breeding or releases of mallards.

#### **Otago Acclimatisation Society**

Between 1912 and 1915 the Society bred mallards for release at 2 of its properties, Opoho and Clinton, and also made use of the Government poultry farm at Milton. In total 322 mallards were liberated (OAS 1919 ann. rept.) at sites including Lakes Onslow, Waihola and Waipori, and at Waiwera and Waikouaiti before the Society decided they were well enough distributed to be placed on the hunting licence.

Despite proclaiming (OAS 1923 ann. rept.) that "Your Council do not regard these birds as favourably as our native grey duck, and for this

reason discontinued breeding them”, a trapping and redistribution programme was initiated in 1925 which, over 3 years, saw in excess of 500 mallards caught at the Waikouaiti sanctuary and relocated, mostly to Lake Waiholo. Some were also sent to the Lakes, Marlborough and Auckland Acclimatisation Societies.

### Southland Acclimatisation Society

“Between 1910 and 1915, some 700 mallards of good strain were reared and liberated in various sanctuaries in Southland. Despite the ravages of weasels and stoats these nest freely and rear their young. The Society entertains hopes of the complete success of this experiment in acclimatisation. C.A. Whitney esq of Auckland has been a generous friend to the Southland Acclimatisation Society in donating from time to time birds to introduce fresh strains of this splendid sporting duck” (Stock 1916: 39). The Society employed the novelty of attaching marked leg bands to 100 birds released in 1911 and asked other Societies to report their recovery (*Ashburton Guardian* 3 Nov 1911), possibly the earliest example of bird banding in New Zealand.

Watt (1967) noted that “it was not until 1910 that the society liberated the first mallards and for about the next 15 years considerable liberations were made almost annually”. Stock (1927) listed a total of 1382 mallards as having been released. Liberation sites mentioned in annual reports include Lake Ada (1920, 21), Lynwood Station (1920) and Victoria Park in Invercargill (1922, 23). However, in 1923, the Society’s Matura game farm was sold and all of its mallards released at Victoria Park. The Society undertook no further mallard breeding or releases until the 1940’s.

### Importations and activities of Cecil Whitney and Auckland Acclimatisation Society

The history of mallard acclimatisation within the Auckland – Waikato region is primarily the history of the Whitney family’s influence on the activities of the Auckland Acclimatisation Society (Sullivan 1997). Foremost among them was Cecil Arthur Whitney (1868-1956; Fig.1).

Cecil Whitney served as a long-time councillor of the Auckland Acclimatisation Society (off and on from 1891 to 1932), being its President (1925-28), and held a delegate’s position on Council until 1947. A man of strong will and personal wealth, who at times treated the Society as his personal possession (Sullivan 1997: 88), he was a fervent advocate for the stocking of New Zealand with exotic game, especially waterfowl and salmonid fish (McDowall 2007). Mallard was the one species in which he took an active personal interest. While his father, John Whitney, reared them in considerable numbers at his “Wenderholm” estate at Waiwera (Eastwood

1933), Cecil did likewise in the grounds of his Colonial Ammunition Company factory in Mt Eden. These descendants of his father’s 1887 importation were distributed extensively in the South Auckland and Waikato areas in some years preceding 1910 (*Progress* 2 May 1910).

A press report that “Mr Whitney has recently sent to Mr Charworth Musters, of Annesley Park, Notts., England, for 6 more mallard drakes; these will come out by the *Coronithic* due in New Zealand about October next” (*Rangitikei Advocate* 2 Apr 1910) is an initial indication of his desire to import further mallards. We cannot confirm that these birds arrived but accept they most likely did. However, in Sep 1914, what may (or may not) have been the largest mallard importation reached Auckland.

### Whitney’s 1914 importation

“The steamer *Kaikoura* recently brought from England a fine consignment of purebred English wild ducks procured from the Scottish sea coast, and also 6 pair of coots or baldcots. They were all consigned to Mr C A Whitney, and only one of each species died on the voyage” (*NZ Herald* 15 Sep 1914; *Evening Post* 16 Sep 1914). There is no mention of the numbers of mallards imported but Whitney (1942) in his reminiscence on mallards in New Zealand wrote that “About 1916 (sic) the Auckland Acclimatisation Society imported 600 mallards from England. Four hundred of these were liberated on arrival, many being shot the same year, but some of the progeny were sent to Takapuna, Okoroire, Pokeno, Muranda(sic), Te Kuiti, Matamata, The Auckland Domain, Whitianga, Maretu, and Dargaville and to several places in the Wellington Acclimatisation Society’s district.....”.

Sullivan (1997:93) suggests a possible source for this importation by observing that John Whitney “held land at Knockbrenn, Kirkcudbrightshire in the south coast of Scotland where the keeper bred large numbers of mallard duck each year. Young Cecil, when not attending Borgue School, would help liberate them on the lakes of the estate...” However, neither he, nor Ashby (1967), offer any indication of the size of this importation.

The AAS 1911-18 annual reports carry no reference to this importation, and scant comment about mallard breeding or releases. Ashby (1967) states that in 1911, 7 mallard were captured and penned on the Society’s Tapapa game farm and others were distributed to sub-societies. He reports that mallard breeding at Tapapa continued until 1915 when this game farm was sold. Although figures given in the 1911-14 annual reports confirm ~25 mallards were bred each year, and nothing thereafter, they also confirm private breeding initiatives from which some of the affiliated gun clubs benefitted (e.g. Huntly; AAS 1913 ann. rept.).

Ashby (1967:67) states that in 1917, "Orders were placed in England and America for the English duck (mallard) and widgeon but because of war demands on transport, there was little hope they would be fulfilled for months. The Council was still waiting a year and a half later." However, a new game farm was established at Cambridge and both John and Cecil Whitney provided mallards to commence a breeding programme. From breeding and donations 143 were liberated on Cambridge Lake in 1919 from where it was expected they would breed and disperse. However subsequent annual reports are silent about any mallard breeding and releases thereafter until 1926 when 18 were purchased from an Auckland breeder and released at Te Awamutu.

There is no doubting a 1914 importation of mallards by Cecil Whitney, but of how many? Whitney's 1942 recollection (*loc. cit.*) of 600 seems improbably large, especially given the original press report and the difficulty of handling 600 birds on board ship and after arrival. It would have been by far the largest single importation of gamebirds made to that time, and probably ever. Furthermore, the absence of reference to it within AAS annual reports, and the general lack of activity surrounding mallard breeding by the Society at the time, does not suggest any spectacular and sizeable importation.

#### *The 1927 importation*

Despite an obvious increase in mallards in many parts of the Society's district, the AAS chose to import more. At its Apr 1927 annual meeting, with Cecil Whitney in the chair, a motion to breed and release mallards to counteract the decline in wild duck numbers was passed. Emphasis on the need for "pure" wild mallards led to a suggestion that importation of "genuine wild mallards" was needed.

In Nov 1927, the *s.s. Port Hardy* arrived in Auckland with a large consignment of mallard. "Only 7 of the batch of 400 succumbed during the trip.....The duck fed on over one ton of the grain since leaving London" (*NZ Herald*, 11 Nov 1927). The order had been sourced from Messrs Kearsy and Johnson, Highwycombe, Buckinghamshire at Whitney's instigation but Society records indicate that it, rather than Whitney, took delivery of the birds and managed their care and distribution thereafter. Ashby (1967), transcribing from the AAS 1928 & 1929 annual reports records the consequence of this importation thus: "These were distributed among breeders. Another 50 brace were bought from the Otago Acclimatisation Society, added to 100 pair obtained locally and liberated on a sanctuary at Rangiriri. Unfortunately the hopes the Society had pinned on breeders for mallard were not realised. It was found that they suffered a high mortality rate, cost more to feed than had been anticipated,

and preferred to 'mooch' rather than forage for themselves once they had been liberated. Including the birds from England, the experiment produced only 690 duck, which cost £135 to distribute".

The last reference to these birds appeared in the AAS 1930 annual report indicating that all stock birds still in breeders' hands had been re-gathered and, along with 112 young mallards purchased, had been "liberated in distant swamps". "It is not possible to get hand-reared birds sufficiently wild, consequently further importation or purchase is unlikely". The Society's interest subsequently turned to attempts to breed and release grey duck.

#### *Mallards from the USA*

In the wake of the 1927 importation's unproductive outcome, Cecil Whitney agitated for more mallard importations. This was against a background of continued decline in grey duck numbers. At the Society's 1933 AGM Whitney proposed "the importation of 500 pairs of wild mallard ducks to arrive in February 1934, for breeding purposes", but it was defeated on a vote taken (AAS records, 1933 AGM rept.). Whitney tried again the following year, successfully moving "...That the Council be recommended to concentrate during the next 3 years on the breeding, rearing and liberation of wild duck, greys or mallards, and that the Council be recommended to order from England and to apply to the Department of Internal Affairs, for permits to import from England in each year of 1934, 1935 and 1936 not less than 50 pairs of pure bred mallards from guaranteed wild stock" (AAS records, 1934 AGM rept.).

Whitney also used the pages of major newspapers, and of the New Zealand Acclimatisation Society Association's *New Zealand Fishing and Shooting Gazette* (NZF&SG) as a platform for his views and in one letter (NZF&SG Dec 1933) indicates he had recently imported further mallards. He fanned a long debate in the pages of Christchurch's *Press* (Jun - Nov 1933) about the merits of mallards and why suggestions of hybridisation with grey duck were fallacious. Edgar Stead's final tirade in opposition (*Press* 20 Jan 1934) encouraged the paper's editor to call a halt to this voluminous, and at times heated, correspondence but much of it was repeated in NZF&SG (Nov - Dec 1933). Certain that hybridisation between wild mallards and grey duck did not occur Whitney advertised his willingness to pay £10 to any hunter able to send him a genuine grey-mallard hybrid (NZF&SG Mar 1934; *Dominion* 20 Apr 1934), which saw his advertisement wonderfully lampooned as "rewards for ducks" in a letter to the *Press* (28 Apr 1934).

Meanwhile, Whitney enlisted help from Harold Basford, secretary of Ducks Unlimited in California, USA, to source and freight what

he later called "Canadian" mallards to New Zealand. With an import permit in the name of Auckland Acclimatisation Society Basford sourced 50 pairs from C.L. Sibley's Sunnyfield game farm in Wallingford, Connecticut (IAD file 46/69/2; the source becomes "Warrington" in Whitney's public writings), rail freighted them across the continent to San Francisco, and they reached Auckland on 9 Apr 1937 on s.s. *Wairuna*. Whitney was quick to announce (*Auckland Star* 22 May 1937) and depict (*NZF&SG* Jun 1937: 17) the arrival of 99 mallards, and Basford later chronicled some of the drama surrounding their despatch (*NZF&SG* Apr 1938: 6). Despite the import permit being issued to the Auckland Acclimatisation Society, Whitney drove the importation process and distribution of the birds. "They were a gift and consigned to the Auckland Acclimatisation Society" wrote Whitney (*loc. cit.*) and indicated that his immediate sending of some of the birds to the Government (Internal Affairs Dept.) game farm at Rotorua (Ngongotaha) was "to facilitate their breeding and release and the later despatch of eggs back to the Society at a reasonable cost in order to minimise Society expenditure". The birds came as a surprise to the game farm's managers.

Already acquainted with the game farm's curator, John Digby, Whitney wrote to him (26 Mar 1937; IAD 46/69/2) advising that "his lot" would be sent immediately after the birds were "banded and sorted" at the Colonial Ammunition Company works. Twelve mallards (5 ♂, 7 ♀) reached Ngongotaha on 14 Apr 1937 whereupon the astute curator, seeking to serve 2 masters, wrote to his superior, Wildlife Conservator A. Kean (25 Apr 1937) asking "would you please let me know what is required with these birds and if it is the Department's intention to breed from them". Up the chain of command the query passed - from Kean to the under-secretary of Internal Affairs (J. Heenan) and thence to the Minister, W.E. Parry, already a shooting guest of Whitney's and the recipient of considerable correspondence from Whitney on acclimatisation matters. The minister's response was a brief "construct a pen and breed them" (IAD file 46/69/2).

Whitney also sent 12 of the imports to the Department's Tokaanu trout hatchery where pheasant (*Phasianus colchicus*) breeding was also taking place (IAD file 46/69/2) and in Dec 1937 supplied the Ngongotaha game farm with eggs laid by his remaining imports, both actions drawing complaints from Kean about Whitney's interference.

But bureaucrats have their ways! Almost upon receipt, 9 of the Tokaanu birds were given away (IAD file 46/69/2). Then, in Nov 1938, 96 mallards from Ngongotaha, including some of Whitney's

stock birds, were released on Lake Rerewhakaiteu, near Rotorua where they immediately bred with domestic ducks (IAD file 46/69/1; *Auckland Star* 5 May 1939).

Whitney dispersed his 1937 birds widely to breeders in and around Auckland, as well as retaining some himself. He also sent 5 ♂, 1 ♀ to the Otago Acclimatisation Society (*Otago Daily Times* 28 May 1937), as well as to breeders at Leeston (Canterbury), Marton, and Taupo (*NZF&SG* Nov 1937:10). The AAS 1940 annual report records the liberations of 100 progeny of the imported birds held by one local breeder.

Whitney reported (*NZF&SG* Feb 1939: 4) that all the imported birds had laid well and despite a poor hatching success "there were several thousand mallard ready to liberate in November last" and that the Auckland Acclimatisation Society was "hoping to be able to liberate two or three thousand next November and December". Officially, the Society wasn't that enthusiastic (see later) but Whitney was already planning a wider distribution of eggs within New Zealand as well as seeking further importations

#### *Egg importations from the USA*

In Apr 1938, Whitney publicly announced his impending receipt of 500 mallard eggs from United States (*NZ Herald* 8 Apr 1938; *Dominion* 11 Apr 1938). After being reminded of the necessity of an import permit by the Minister (Parry), Whitney duly applied and was granted a 2-month-long permit to import 500 mallard eggs from California (IAD file 46/69/2). In his letter of application Whitney indicated the eggs would come on a Matson line ship (*Mariposa* or *Monterey*) and added that "if there is airmail leaving San Francisco during April or May I have given instructions that the duck eggs be sent by it if Mr Sibley advises they can be carried with safety and retain fertility" (IAD file 46/69/2). They did not arrive.

Although this particular permit lapsed, it signaled a new interest, that of importing eggs of game birds as a cheaper alternative to bringing in live birds. Whitney elaborated on this the following year when he obtained another permit (Jan 1939) to repeat the mallard importation, and eggs of woodcock (*Scolopax rusticola*) also; "An experiment is being made to import mallard and other game bird eggs from America during March, April and May, and if successful, it will clear the way for acclimatizing the common snipe, woodcock, English teal, golden plover, curlew and other valuable game birds in this country...." (*NZS&FG* Feb 1939). That permit lapsed and was not extended although Whitney advised the Minister (IAD file 47/65/1; 17 Apr 1939) that he anticipated the mallard eggs on the Matson liner *Monterey* later in the month. There is,

**Table 2.** Summary of numbers of mallards bred and released by Acclimatisation Societies in decades 1940's – 1960's. "Private" indicates breeding and releases not funded by Societies; "egg" indicates the Society's role was confined to providing eggs to members for rearing and subsequent release. Northland region includes 4 small Societies, Taranaki and West Coast regions each include 3 Societies.

| Acclimatisation Society | 1940's         | 1950's          | 1960's                 |
|-------------------------|----------------|-----------------|------------------------|
| Northland region        | ~500           | -               | -                      |
| Auckland                | 500 + private  | 2000 + private  | -                      |
| Tauranga                | ~100           | 2500            | -                      |
| Wellington              | ~500 + private | ~2000 + private | -                      |
| Taranaki region         | ~500           | ~1500           | -                      |
| Wanganui                | 70             | ~200 + private  | -                      |
| Hawkes Bay              | -              | ~2000           | -                      |
| Internal Affairs Dept.  | ~3000 + egg    | -               | -                      |
| Waimarino               | -              | ~50             | -                      |
| Nelson                  | Egg            | 1500 + private  | -                      |
| West Coast region       | 100 + egg      | ~600            | 700 and ~800 in 1970's |
| North Canterbury        | 160            | -               | -                      |
| South Canterbury        | Egg            | -               | -                      |
| Otago                   | ~700           | -               | -                      |
| Southland               | ~500 + private | 1743            | 6652                   |

however, no evidence that they arrived. Later (Oct 1939), Whitney again applied for, and was granted, a permit to import eggs from San Francisco, this time 100 common snipe (presumably Wilson's snipe *Gallinago delicata*), 100 woodcock, and 500 mallards. Harold Basford of Ducks Unlimited was once more his primary US contact.

Whitney's attempted mallard egg importations are not without some confusion in their public reporting. Whitney (1942) states "An experiment was tried with Canadian mallard eggs from America. On arrival by *s.s. Monterey* they were immediately put into the incubator by Mr Digby (who by this time ran his own game farm at Waimauku) and 44 per cent hatched out, 42 per cent being reared to maturity. These were given by the Society to Whitianga and Taumaruanui affiliated clubs."

Basford (NZF&SG Sep 1941:3) reports "Last year we (he and Whitney) had considerable correspondence in an effort to get about 500 mallard eggs but due to the distance and time in mail and finding it impossible to secure funds out of your country, etc., we finally secured 45 mallard eggs as an experiment. My impression is that the hatch was quite successful. Mr Whitney has requested me to endeavour to get about 500 bobwhite eggs. ... In addition to this he is very anxious to try and propagate our famous sprig or pin tail duck which

breed in Canada and are shot over most of our country."

In a report to the AAS Whitney wrote "I have imported mallard eggs from America by air and 45 per cent have hatched and 42 per cent were reared. I hope the new Council will repeat this egg importation on a large scale and incubate for liberation" (AAS 1944 ann. rept.). Although AAS historian Sullivan (1997) links Whitney's comment about possible importation by air with the brief renewal of commercial air transport between New Zealand and USA in mid-1940, this seems unlikely because no airmail service was involved.

We conclude that 45 eggs were received as Basford (1941) reported, not the desired 500, and that Whitney's quoted hatching figures refer to this smaller number. They would have been sent in the northern hemisphere spring, most likely of 1941, but whether they arrived by air or sea we know not.

Subsequently Whitney sought, but was refused, permits to import grey (black) duck and wood duck (*Chenonetta jubata*) eggs from Australia (1944), further mallards from San Francisco (1944), and pintail (*A. acuta*) eggs from USA, pintail and grey duck (=spot-billed duck *A. poecilorhyncha*) eggs from India (1945). He was, however, granted permits to import 50 eggs of each of Wilson snipe, pintail duck, and European (American?) wigeon (*A. penelope*) eggs from San Francisco (1941), and 500 mallard

eggs from England (Feb 1946, renewed Nov 1946), the latter to be air-freighted with a planned lot of pheasant eggs for the Auckland Acclimatisation Society. All permits lapsed.

### BREEDING AND RELEASES POST-1940

The general decline or cessation of regional mallard breeding and releases evidenced in the late 1920's and 1930's (Table 1) was replaced by robust debate about the wisdom of further mallard introductions, compilation of evidence of hybridisation with grey duck, and sufficient concern about the grey duck's decline in the face of wetland drainage and agricultural activity to promote its captive breeding. The debates in the media, especially in *NZF&SG* and *Christchurch's Press* (Jun 1933 – Jan 1934), were public expressions of these concerns but they also occurred around the tables of many Acclimatisation Societies and that of the national Council of North and South Island Acclimatisation Societies (McDowall 1994). Government wildlife officials were also advising their Minister about their concerns, and after conducting a review in 1933 (IAD 46/69/1) they strongly advised against further mallard releases. This period of debate was largely fuelled by Whitney's persistent advocacy for mallards during which he, and his supporters, expressed the conviction that pure wild mallards were monogamous and did not pose a hybridisation threat, unlike domestic breeds. Whitney subsequently completely overturned the release quiescence by his initially unsolicited distributions, particularly in 1938 and 1939, of large quantities of eggs laid by his newly-imported "Canadian" mallards. By 1940-41, 11 Acclimatisation Societies were breeding and releasing mallards, and so too a government department (Table 2). The scale of individual Society activity is indicated below.

#### Northland Acclimatisation Societies

The Hobson Acclimatisation Society, based at Dargaville, received 3 dozen eggs from Cecil Whitney in late 1938 (Hobson 1939 ann. rept.) and the resulting ducks were reared and liberated. The 1941 annual reports of all 4 Northland Acclimatisation Societies (Hobson, Mangonui-Whangaroa, Bay of Islands, Whangarei) indicate each receiving eggs that year, 500 in the case of Whangarei. Apart from Mangonui-Whangaroa purchasing and releasing a small number of mallards in 1947 and 1948 there are no other indications of mallard acclimatisation attempts in Northland.

#### Auckland Acclimatisation Society

In early 1939, the Society purchased 122 progeny of Whitney's USA mallards and released them at Lake Waikare and Lake Arapuni. A further 100

were released the following year at the same 2 sites as well as at Wellsford, Raglan and Waiuku. This modest start was complemented by Whitney releasing 400 birds and distributing 1200 eggs to breeders (AAS 1940 ann. rept.). Concerned that war time hunting restrictions would reduce its income, the Society purchased none in 1941, just 36 in 1942, and 10 in 1943. The Society's alternative approach was explained (1944 ann. rept.) as being "to purchase small parcels of the Canadian imported birds and their purebred progeny and hand them to certain sub-societies for breeding under protected conditions in the wild".

Despite the Society's official reticence to spend money on mallard liberations, Whitney proceeded apace. He reported (AAS 1944 ann. rept.) that in 1941 and 1942, he had released 800 birds in the lower Waikato and distributed 3500 eggs. His lake at Churchill near Rangiriri is likely to have been his major release site, as it had been previously.

Now in his 80's, Whitney continued to advocate for more Society commitment to mallard acclimatisation, including the need for further importations. He attended meetings of various sub-societies to make his case (e.g. Ohinemuri 1942) and forced a lengthy discussion at a Te Awamutu council meeting (AAS 1945 ann. rept.) where, seemingly with difficulty, the Council resisted him. The Council then reaffirmed its approach of liberating just a few pairs in any district where grey ducks were not plentiful by purchasing and distributing 100 birds to Morrinsville, Pio Pio, Thames, Ohinemuri, Cambridge, Waihi, Te Awamutu and Hamilton, and added another 58 birds the following year at Ngaruawahia, Thames, Miranda and Waihi. Whitney's continued annual releases and egg distributions were recorded e.g., 87 birds and 1000 eggs in 1947 (AAS 1947 ann. rept.).

Whitney severed his formal association with the Society in 1948 and references to his activities in its annual reports cease at that point. However, a supply of eggs from him to the Waihi sub-society is recorded in the AAS 1951 annual report.

The legacy of Whitney's egg distributions and of small numbers of birds given by the Society to selected sub-society members is recorded intermittently in 1948-1952 annual reports. It is apparent that many sub-society members were breeding and releasing mallards but that the scales of their activities have not been recorded in the AAS annual reports.

In an abrupt change of policy in 1953, the AAS allocated £500 for mallard purchase and release, and the purchase of pure-bred stock from the Wellington Acclimatisation Society (AAS 1953 ann. rept.). The basis of this new initiative was the supplying of eggs to sub-society members, much as Whitney had done a decade before. This continued

over 4 years until halted in 1958 after a paper, presented to a meeting of the North and South Island Acclimatisation Societies Council in Mar 1957 by Wildlife Branch biologists R.W. Balham and K.H. Miers, was critical of the consequences to grey duck of mallard release schemes and urged their immediate cessation. This paper was widely published (e.g. Marlborough, North Canterbury 1958 ann. rept.) and several other Societies ceased mallard breeding in response.

Between 1954 and 1957 the Society spent over £1600 on mallard releases conducted by its Helensville, Patetonga, Raglan, Te Aroha, Morrinsville, Hamilton, Huntly, Ngaruawahia, Pio Pio, Franklin, Taumaranui, Cambridge, and Matamata sub-societies. The sizes of most releases are unspecified but those that are range from 30 to 200, and possibly 2000 birds were released under this programme. Small scale breeding and releases in the Thames – Coromandel region, which Whitney had supported for so long, may well have persisted also.

#### **Wellington Acclimatisation Society**

“A new departure in the activities at the (game) farm is the breeding of mallard duck. Mr C. A. Whitney of Auckland very generously presented the Society with five hundred eggs which were entrusted to a professional breeder for incubation” (WAS 1939 ann. rept.). Thus was announced the commencement of a renewed programme that extended, with variable vigour, until 1958. For example, about 350 were released in Wairarapa, Hutt Valley and Horowhenua annually during the first 3 years before the programme declined in 1946-7 to having just a few retained at the game farm to provide eggs and a small number of young to meet regional hunting club requests. In 1950, 72 birds were reared again at the Masterton hatchery and eggs provided to a private breeder to fuel Wairarapa releases – almost 700 during 1951-54. Meanwhile, at the Paraparaumu game farm, mallards were nesting freely in and around its grounds and over 100 fledged there in 1954 alone (WAS 1954 ann. rept.). Most of 600 bred at the farm in 1956 were released near Levin, while other birds breeding near the farm were trapped and supplied to breeders (WAS 1957 ann. rept.). Clearly there was continuing private breeding and release activity aided but not funded by the Society.

#### **Wanganui Acclimatisation Society**

This Society recaptured its interest in mallards with an experiment “to lift duck eggs from selected areas and placing them with breeders for hatching and rearing....and then be liberated on sheltered waters” (1949 ann. rept.). The initial 70 released were followed by 80 the next year and an unspecified number again in 1950-51 when the “pedigree was doubtful...some eggs purchased ...

but trend towards domestic strain too pronounced” (1951 ann. rept.). Nevertheless, 62 were released in 1951-2.

Subsequent references in the Society’s annual reports are limited: in 1956 is mention of “3 small lots being liberated and some being retained by breeders to breed further lots for liberation”; a lot of 10 being released in 1957; and in 1959-60 “For the first time in some years the Society made a small duck release. Eggs were available from the West Coast Society .....and a successful hatching was the result”.

#### **Waimarino Acclimatisation Society**

A desire to “stock up with mallards” (1954 ann. rept.) was thwarted when none could be procured for release. In the following year, just 10 birds were released but were considered too domesticated to be useful and reportedly mated with khaki campbell domestic birds the following year. In 1957, 31 birds obtained from the WAS game farm were released, but there the venture ceased.

#### **Tauranga Acclimatisation Society**

Although a single liberation in 1934 is reported, further interest was not generated until about 1946 when eggs were purchased from Cecil Whitney (Tauranga Acclimatisation Society 1982). Between 1949 and 1955, 2521 mallards were released (1950-56 ann. rept.) before a halt was called pending an understanding of how well they survived or contributed to hunters’ bags. This was not forthcoming and there are no subsequent direct references to mallard releases in the Society’s annual reports. However, “purchase – mallards” appears in its expenditure accounts for 1963, 1964 and 1965, suggesting a modest level of mallard release activity then, but not thereafter.

#### **Taranaki Acclimatisation Societies**

Three small societies operated in the Taranaki province – Hawera, Stratford and Taranaki. All released mallards at the same time; Hawera ~1141 between 1948 and 1958, Stratford a stated 331, but probably considerably more, between 1948 and 1957, and Taranaki 4-500 in some years between 1947 and 1957 (see respective society 1948-1958 ann. rept.).

Their programmes originated from a gift of 50 eggs from Cecil Whitney (Stratford 1948 ann. rept.) which were hatched by a local breeder and birds thereafter dispersed amongst breeders in each district from whom the Societies then purchased back birds for their releases. These releases ceased following the Wildlife Branch’s 1957 urging to do so (Hawera 1958 ann. rept.).

#### **Hawkes Bay Acclimatisation Society**

Despite mallard having established itself in coastal Hawkes Bay 15-20 years previously, and mallards banded in the Waikato, Manawatu and Wairarapa

all reaching its district (1952 ann. rept.), the Society bred mallards for release at its Greenmeadows game farm for the first time in 1952 (Wellwood 1968). Newly-hatched ducklings were distributed to members to rear, and 300 were released. This approach continued annually until 1960 (1952-60 ann. rept.) and where numbers are recorded, the releases were each of ~300. Ahuriri Lagoon at Napier and the Norsewood-Dannevirke area were the principal locations of release.

#### **Department of Internal Affairs Ngongotaha game farm**

The game farm was established in 1935 with the specific intent of acting as a national breeding centre for the supply of pheasants to Acclimatisation Societies. Whitney's donation of newly-imported American-sourced birds, and subsequently of eggs, saw mallard breeding added to its operations.

Details of mallard breeding at the game farm and of the birds' releases are recorded in annual reports of the Internal Affairs Department (AJHR 1938-1950) and on archived files (IAD 46/69/1, 46/69/2, 51/2, 51/2/1). From 1938, when the first 96 were released onto Lake Rerewhakaitu, to 1949 when the last (29 mallard x grey duck hybrids) were released at Hamurana on Lake Rotorua, a total of 2792 mallards were set free. Other release sites recorded were Lake Waikaremoana, Lake Rotoehu, Tokaanu on Lake Taupo, Te Awa o te Atua Lagoon at Matata, and Whakaki Lagoon at Wairoa, most receiving multiple releases. Requests for mallard releases in Gisborne-East Coast in 1948 (IAD 51/2) may also have been met. The game farm may also have been a supplier of eggs, as indicated by requests from the Wildlife Branch's Southern Lakes wildlife conservancy to fuel mallard numbers in the Queenstown-Wanaka areas (IAD 46/69/2).

#### **Southland Acclimatisation Society**

A return of interest in mallard breeding is highlighted in the 1941 annual report thus: "During the season the game committee extended its breeding operations in so far as securing pure-bred mallard eggs from Mr Whitney at Auckland.....The result is that we have now fifty full-grown birds at our game farm at Makarewa to continue our next season's breeding operations. The progeny of these ducks will be liberated in various districts where the grey duck is not so plentiful."

Annual reports of the next 4 years indicate 285 plus "a quantity" of mallards were released before the Makarewa game farm was closed and a new one established at Lake Muruhiku (SAS 1946 ann. rept.). Although the 1948 annual report indicates the local city council assisted with rearing mallards at its Queens Park gardens, the Society reports contain no references to breeding and liberations again until 1954.

Concerned that up to 90% of young wild mallards may be dying before maturity the Society recommenced a vigorous breeding and release programme with a determination to record its value to its hunter members. Between 1955 and 1963, 8195 hand-raised mallards were released at 261 places throughout Southland, of which 10.7% were retrieved by hunters (Reid & Miers 1964; Reid 1966). Not all of this breeding was confined to the Muruhiku game farm and it is possible that unreported releases from participating breeders also occurred.

#### **Otago Acclimatisation Society**

Otago was the first Society beyond Auckland to obtain stock (5 ♂, 1 ♀) sourced from Whitney's 1937 importation. These were bred with locally-sourced birds (OAS 1939 ann. rept.). In 1938, Whitney sent 72 eggs sourced from his imports from which 58 ducks were reared with 15 immediately being released at Waikouaiti and the remainder retained for breeding (OAS 1939 ann. rept.). From this stock, the OAS embarked upon a modest breeding and release programme during 1940-43 with a minimum of 700 birds being placed on waters within easy reach of Dunedin. By early 1943, the game farm's breeding stock of Whitney-derived birds had been reduced to 2 ♂, 12 ♀ (OAS 1943 ann. rept.) and despite no records of further breeding and releases, some were still in captivity in 1947 (OAS 1947 ann. rept.). However, the Society's avicultural interests had, by then, returned to pheasant.

#### **Nelson Acclimatisation Society (NAS)**

"Owing to the generosity of Mr C.A. Whitney of Auckland, a number of sittings of eggs were supplied to this Society for hatching purposes.....a number have been liberated .....several pairs have been retained for breeding purposes. ....45 young birds have been reared" (NAS 1941 ann. rept.). Whitney supplied further eggs the following year which were distributed to Society members for incubation and rearing.

No references to mallards appear in subsequent annual reports until 1953. Sowman (1981) suggests that this lack of follow-up on Whitney's gifts was "because it was believed that the mallard was not a good waterfowl to have because of its tendency to crossbreed with the native grey duck, and in fact with almost any breed of duck that was around, thus too causing almost self-depletion of its numbers by this act".

The breeding and release initiative in 1953 was based on breeding stock supplied by the Wellington Acclimatisation Society and the contributions of local Society members already breeding and releasing mallards privately. In its first year this project produced 1375 eggs for distribution to farmers and sportsmen and saw 320 birds released at

30 localities in Nelson, Golden Bay and on D'Urville Is (NAS 1954 ann. rept.). Over the subsequent 4 years approximately 1500 mallards were released (NAS 1957 ann. rept.) before the Society ceased its activities in response to the Wildlife Branch's urging to do so.

#### **North Canterbury Acclimatisation Society**

Given the vociferous opposition to further mallard importations expressed in the *Press* in late 1933 (cited above), it is perhaps remarkable to find that "C. A. Whitney Esq. of Auckland, an enthusiastic breeder of the Canadian mallard duck, generously donated 300 eggs and the progeny raised, 98, will be liberated" (NCAS 1941 ann. rept.). Another 67 were raised the following year before all stock was disposed of and the game farm closed until war's end (NCAS 1943 ann. rept.). Mallard breeding never recommenced and the Society also rebuffed Whitney's offer in 1946 of 50 pure-bred mallards for liberation on the Avon River.

#### **South Canterbury Acclimatisation Society (SCAS)**

"Your Council accepted an offer from Mr Whitney of the supply of a large number of sittings of Golden (?) mallard duck eggs. These duly arrived in good condition and were distributed amongst farmers who hatched them under sitting hens." (SCAS 1941 ann. rept.; see also *Timaru Herald* 8 Jul 1940). This appears to have been a "one-off" for there are no subsequent references to mallard breeding in the Society annual reports and mallards were already common, and increasing, in the general area (see Waitaki Valley AS 1941, 1944 ann. repts.).

#### **West Coast Acclimatisation Societies**

Three Acclimatisation Societies were active on the South Island's West Coast in 1940 – Westland in the southern half of the region, and Grey and Buller to the north. The latter 2 amalgamated in 1951 to form the West Coast Acclimatisation Society (WCAS).

Westland indicated an interest in mallard introduction (*Christchurch Star-Sun* 5 Jun 1941) and, in late 1941, received mallard eggs from Whitney, and reared and released 30 near Wataroa (1942 ann. rept.). This success saw 13 birds obtained from the Wellington Acclimatisation Society for breeding in 1942 and 15 resultant young plus the stock birds subsequently released at Mahinapua Creek.

In 1951 the Society built a game farm at Lake Kaniere and "mallards procured for breeding purposes" (1952 ann. rept.). Approximately 1000 eggs were obtained from 15 ducks but mortality was high and just 80 were liberated the following year. The 1954 annual report indicates a "considerable number" of mallards were reared by "sportsmen and non-shooters" in the Harihari district and an unspecified number of birds from the game farm were released in the Arahura Valley. At that time

the main concentration of mallards was reported in the Kokatahi - Kowhitirangi - Harihari area. The following year "a substantial number was liberated after the shooting season" (1955 ann. rept.) and the bird placed on the hunting licence for the first time.

Thereafter the Society's annual reports do not record any breeding or liberations of mallards although "liberation expenses" and food costs were reported in the annual accounts for 1956 and 1957, and WCAS received "18 of their breeding birds". "The mallard is on the increase and could eventually upset our grey duck population" cautioned the 1963 annual report and by 1967 "the (mallard) population has grown tremendously over the last few years".

The 2 northern Societies, Grey and Buller, both signalled their interest in mallard acclimatisation in their late 1940's annual reports and in 1948, just prior to their amalgamation, the Grey Society procured "a number of mallards" which were provided to volunteers for breeding. By the next year, some (unspecified) liberations had occurred, and in 1950 further stock birds were purchased. The amalgamated Societies then commenced the most enduring mallard breeding and release programme of any Acclimatisation Society, with birds bred at its Lake Ryan game farm being released every year from 1951 to 1974 (various WCAS ann. repts.). The numbers released annually hovered around 100 but reached 184-193 in the final 2 years. Over 2000 birds were released under this programme with most lakes, coastal streams and inland wetlands of the region receiving multiple releases.

#### **DISCUSSION**

The published records we examined suggest a minimum of 30,000 mallards were reared and released by Acclimatisation Societies. The real number released, however, is undoubtedly well in excess of that figure; non-reported Society releases and the individual breeding and release activities of many Society members, farmers, and private game farms will add considerably to that total. The acclimatisation of mallard was one of the most extensive and prolonged of all wildlife introductions to New Zealand, although it would still rank a distant third behind the continuing releases of salmonid fishes and pheasant.

The initial attempts to establish mallard can mostly be viewed in the context of surrounding new British settlers with the fauna and flora of their homeland (McDowall 1994). These pre-1910 releases did not immediately establish mallard other than in small and local enclaves and particularly at public reserves and sanctuaries where they were fed. Nor did they establish significant wild populations sufficient to be hunted (a strong pioneering ethic) until about the 1920's, ironically a time when

direct Society interest in mallard releases was waning. Even then, an off-made comment was that the released birds were rather tame and did not disperse far from the location of release. They were, after all, descendants of many generations of game farm stock.

The widespread decline of grey duck in the wake of New Zealand's extensive landscape change and wetland drainage undoubtedly changed the initial motivation within Acclimatisation Societies for mallard breeding and releases. Faced with a diminishing native quarry how could they provide for their hunter members? To breed and release further mallards was not their immediate response, however. Most Societies shared the public concern of the early 1930's about the grey duck's decline and its hybridisation with mallard. Some attempted grey duck breeding (e.g. Auckland, Wellington, North Canterbury, Hawkes Bay) and most stopped releasing further mallards (e.g. Wanganui, Auckland, Otago, South Canterbury, Wellington). The national council of North and South Island Acclimatisation Societies recommended against further mallard releases and government's wildlife advisors did likewise (IAD 46/69/1). A prolonged hiatus in mallard releases ensued and would probably have continued into the early 1940's but for Cecil Whitney.

By his unilateral importing of 99 mallards from the USA, and especially his subsequent distribution of these, their eggs, and their progeny Whitney broke the impasse.

In retrospect, it seems astonishing that Whitney could obtain import permits for mallards in the face of strong Society and public opposition and do so as an individual when all importations for acclimatisation purposes were required to be by an Acclimatisation Society. It is indicative of the man's tenacity and influence, and of the political connections he enjoyed.

No political connection seems to have been more important than that with Internal Affairs Minister W. E. Parry. Parry over-rode his official's advice about the irregularity of Whitney conducting private mallard importations (IAD file 46/69/2). Parry directed that the mallards sent by Whitney to his Department's Ngongotaha game farm be retained and bred (*loc. cit.*), and Parry readily agreed to provide Whitney with the necessary import permits which his (ultimately unsuccessful) attempts to source a diversity of other game birds from UK, USA and India required. Indeed, Parry may well have been influenced by Whitney early in his ministerial tenure; in response to a suggestion that the State farm at Ngongotaha would be suitable as a game farm for pheasant breeding, he stated "We are looking for a place in this part of the country. We want a position that will enable us

to have a good lagoon because we want to breed duck as well as pheasants" (*Evening Post* 8 Dec 1936).

The direct consequence of Whitney's 1937 importation and his initial unsolicited distribution of their eggs was a reinvigoration of mallard breeding and release programmes by Acclimatisation Societies throughout New Zealand. No region of the country was bypassed. And if some particular small Acclimatisation Society was not included in the initial distribution it soon craved breeding stock from a neighbour so as not to be left out. By the late 1940's virtually every Acclimatisation Society was releasing mallards, in distinct contrast to the 2 decades prior.

The bulk of mallards released in New Zealand were during the 10-15 years following the cessation of the second world war, a boom period in subsidised land clearance and swamp drainage and of intensified lowland pastoral farming (McLintock 1966). Arguably, this suited the mallard more than the "rougher" lowland landscape of the 1910's and 1920's. An open plains and pothole, not woodland, inhabitant in its native range (Cramp & Simmons 1977; Kear 2005), it found the "cleaner" rural environment more suitable and extensive movements of released or banded wild mallards were soon being reported (Balham & Miers 1959).

Unresolved by our review, however, is the popular contention that it was birds of North American stock that materially aided the establishment of mallard in New Zealand (e.g. Caithness 1983; McDowall 1994). Was the renewed vigour with which mallards were bred and released the deciding factor, or was establishment necessarily influenced by the introduction of birds with allegedly more mobile (i.e. migratory) habits? The scale of 1940's and 1950's releases created concentrations of mallards that had not hitherto been achieved but even so, in some areas of prolonged releases (e.g. Waikato), the build-up in mallard numbers was slow (M. Williams, *unpubl. data*). Perhaps the legacy, and thus the importance, of the American-sourced mallards will have to await genetic appraisal, possible because of differing mitochondrial haplotypes of most Eurasian and North American mallards (Kulikova *et al.* 2005).

The mallard's introduction and acclimatisation was determined and prolonged, but it has also had a profound ecological consequence. Just as introductions of salmonids seriously impacted most indigenous freshwater fishes (McDowall 1990) so too has the mallard affected its indigenous equivalent, the grey duck. Hybridisation between the 2, reported within years of the mallard's initial release, is now the most visible expression of its impact but may not have been the only mechanism by which mallard supplanted grey duck as New

Zealand's common duck. Williams & Basse (2006) argued that the mallard's ready tolerance of pastoral landscapes and of human presence, its early occupation of town and city parks, its higher fecundity and greater longevity than grey duck, and by virtue of its larger size, its ability to physically displace grey duck, have all contributed to its present-day ubiquity.

The mallard too may not have escaped unaffected. Hybridisation and introgression have not been unidirectional (Rhymer *et al.* 1994); the mallard genotype and phenotype now incorporates grey duck characteristics to a sufficient extent as to ask whether the combined grey duck – mallard population is now a hybrid swarm. Confusion as to the phenotype of hybrids has resulted in many more females than males being designated as hybrids in banding records (Department of Conservation bird banding records). This is also reflected in modern survey outcomes with the distribution of grey duck being reported as widespread in a recent bird distribution atlas (Robertson *et al.* 2007) in distinct contrast to its distribution and relative abundance reported by duck hunters (Caithness 1983; Barker 2003). Irrespective of whether New Zealand now has a dominance of mallard or a preponderance of "grallard", the introduction and acclimatisation of mallard in New Zealand was an exercise of zeal and determination, and its outcome can serve to inform Australia and Southern Africa of a consequence should their feral mallard populations expand further.

#### ACKNOWLEDGEMENTS

The assistance of Shona Mackay and Megan Gee at the Department of Conservation and National Institute of Water and Atmospheric Research libraries respectively is gratefully acknowledged, and so too the willing help of Mala Nesaratnam in the Department of Conservation Bird Banding Office. We also acknowledge the foresight of the National Library of New Zealand for compiling a freely-available digital archive of early New Zealand newspapers, "Papers Past", a resource crucial to compiling our story.

#### LITERATURE CITED

- AJHR 1905. Tourist and Health Resorts Department 4<sup>th</sup> annual report. *Appendices to the Journal of the House of Representatives*, H-2.
- AJHR 1938-1950. Department of Internal Affairs annual report. *Appendices to the Journal of the House of Representatives*, H-22. (1938 to 1950 inclusive).
- Andrews, T. 1939. Game birds in the Wellington Acclimatisation district. *Wellington Acclimatisation Society 1939 annual report*: 26-27.
- Ashby, C.R. 1967. *The centenary history of the Auckland Acclimatisation Society 1867-1967*. Auckland Acclimatisation Society, Auckland. 143pp.
- Balham, R.W. 1952. Grey and mallard ducks in the Manawatu district, New Zealand. *Emu* 52: 163-191.
- Balham, R.W.; Miers, K.H. 1959. Mortality and survival of grey and mallard ducks banded in New Zealand. Wildlife Publication 5, Department of Internal Affairs, Wellington.
- Barker, R. 2003. Ten years of divining the unknown. *Fish & Game New Zealand (Special Issue)* 16: 48-52.
- Bradley, B. (designer). 1999. *The Penguin New Zealand atlas*. Auckland: Penguin books (NZ) Ltd.
- Buller, W.L. 1904. *Supplement to the birds of New Zealand*. Vol.2. London: The author.
- Caithness, T.A. 1983. *Gamebird hunting: questions and answers*. Wellington: Wetland Press.
- Cassey, P.; Blackburn, T.M.; Sol, B.; Duncan, R.P.; Lockwood, J.L. 2004. Global patterns of introduction effort and establishment success in birds. *Proc. Roy Soc Lond B (Suppl)* 271: S405-408
- Cramp, S; Simmons, K.E.L. 1977. *The birds of the western Palearctic: Handbook of the birds of Europe, the Middle East and North Africa*. Vol.1. Oxford: Oxford University Press.
- Druett, J. 1983. *Exotic intruders: the introduction of plants and animals into New Zealand*. Auckland: Heinemann.
- Eastwood, R.W. 1933. The late Major John Whitney: Some recollections of visits to Wenderholm. *New Zealand Fishing & Shooting Gazette* 6 (February): 6-8.
- Hermes, N.; Evans, O.; Evans, B. 1986. Norfolk Island birds: a review 1985. *Notornis* 33: 141-149.
- IAD 46/69/2, and similar. Archived files of the Department of Internal Affairs, Archives New Zealand, Wellington.
- Kear, J. (Ed). 2005. *Ducks, geese and swans*. Vol 2. Oxford: Oxford University Press.
- Kulikova, Irina V.; Drovetski, S.V.; Gibson, D.D.; Harrigan, R.J.; Rohwer, S.; Sorenson, Michael D.; Winker, K.; Zhuravlev, Yury N.; McCracken, Kevin G. 2005. Phylogeography of the mallard (*Anas platyrhynchos*): Hybridization, dispersal, and lineage sorting contribute to complex geographic structure. *Auk* 122: 949-965.
- Lamb, R.C. 1964. *Birds, beasts and fishes: the first hundred years of the North Canterbury Acclimatisation Society*. Christchurch: North Canterbury Acclimatisation Society.
- Lever, C. 2005. *Naturalised birds of the world*. London: Poyser.
- Lever, C. 1992. *They dined on eland: the story of acclimatisation societies*. London: Quiller.
- Lockwood, J.L.; Cassey, P.; Blackburn, T. 2005. The role of propagule pressure in explaining species invasions. *Trends in ecology and evolution* 20: 223-228.
- Long, J.L. 1981. *Introduced birds of the world*. Newton Abbot: David & Charles.
- McDowall, R.M. 1990. *New Zealand freshwater fishes: a natural history and guide*. Auckland: Heinemann Reed.
- McDowall, R.M. 1994. *Gamekeepers for the nation: the story of New Zealand's acclimatisation societies 1861-1990*. Christchurch: Canterbury University Press.
- McDowall, R.M. 2007. Cecil Whitney - the ammo man. *Fish & Game New Zealand* 55: 28-32.
- McLintock, A.H. 1966. *An encyclopaedia of New Zealand*. Vol. 1. Wellington: Government Printer.
- Marchant, S; Higgins, P.J. (Eds) 1990. *Handbook of Australian, New Zealand and Antarctic birds*. Vol. 1, Pt. B. Oxford University Press, Melbourne.

- Norman, F.I. 1990. Macquarie Island ducks – habitats and hybrids. *Notornis* 37: 53-58.
- Paton, J.B. 1991. Movement of a mallard from New Zealand to South Australia. *South Australian Ornithologist* 31: 73.
- Reid, B.E. 1966. Hand-reared mallards in Southland. *New Zealand Journal of Science* 9: 630-650.
- Reid, B.E.; Miers, K.H. 1964. Hand reared mallards in Southland – analysis of banded recoveries. Pp. 35-36 in 1964 Annual Report, Southland Acclimatisation Society, Invercargill.
- Rhymer, J.; Williams, M.; Braun, M.J. 1994. Mitochondrial analysis of gene flow between New Zealand mallards (*Anas platyrhynchos*) and grey duck (*A. superciliosa*). *Auk* 111: 970-978.
- Robertson, C.J.R.; Hyvonen, P.; Fraser, M.J.; Pickard, C.R. 2007. *Atlas of bird distribution in New Zealand 1999-2004*. Wellington: Ornithological Society of New Zealand.
- Ryan, C.S. 1906. President's address: On European and other birds liberated in Victoria. *Emu* 5: 110-119.
- Sowman, W.C.R. 1981. *Meadow, mountain and stream: the provincial history of the Nelson Acclimatisation Society 1863-1969*. Nelson: Nelson Acclimatisation Society. 184pp.
- Stock, A. 1916. *History of the Southland Acclimatisation Society*. Invercargill: The Society. 37pp.
- Stock, A.H. (compiler). 1927. *Acclimatisation in Southland*, NZ. Southland News Co., Invercargill. 48pp.
- Sullivan, W.A.S. 1997. *The changing face of Eden*. Hamilton: Auckland-Waikato Fish and Game Council.
- Tauranga Acclimatisation Society. 1982. *Tauranga Acclimatisation Society 1882-1982*. Tauranga: The Society. 26pp.
- Thomson, G.M. 1922. *The naturalisation of animals and plants in New Zealand*. Cambridge: Cambridge University Press. 607pp.
- Tracy, J.P.; Lukins, B.S.; Haselden, C. 2008. Hybridisation between mallard (*Anas platyrhynchos*) and grey duck (*A. superciliosa*) on Lord Howe Island and management options. *Notornis* 55: 1-7.
- Veltman, C.J.; Nee, S.; Crawley, M.J. 1996. Correlates of introduction success in exotic New Zealand birds. *American Naturalist* 147: 552-557.
- Watt, J.O.P. 1967. History of first 100 years. Southland Acclimatisation Society 1967 Annual report, Invercargill.
- Wellwood, J.M. 1968. *Hawkes Bay Acclimatisation Society centenary 1868-1968*. Napier: Hawkes Bay Acclimatisation Society.
- Whitney, C.A. 1942. History of the introduction and establishment of the English wild duck or mallard in New Zealand. *New Zealand Fishing and Shooting Gazette* (February): 2-5
- Williams, M.; Basse, B. 2006. Indigenous gray duck, *Anas superciliosa*, and introduced mallards, *A. platyrhynchos*, in New Zealand: processes and outcome of a deliberate encounter. *Acta Zoologica Sinica* 52(supplement):579-582.